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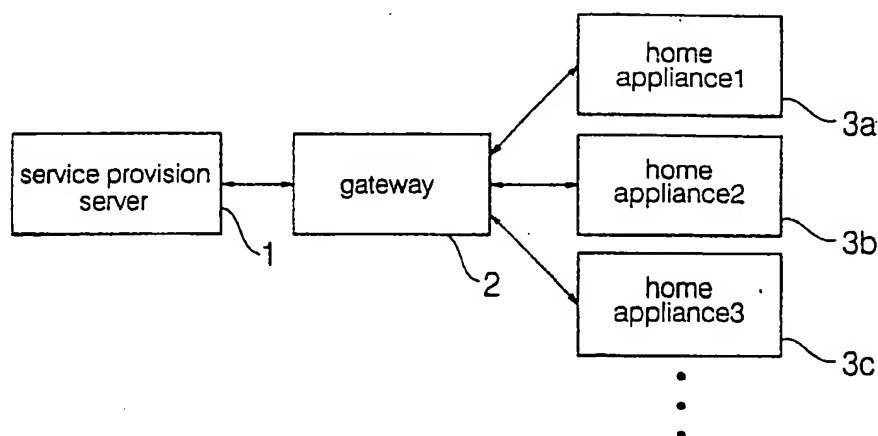
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(54) **Home appliance protocol upgrading method**

(57) A method for upgrading a protocol of a home appliance which is manufactured for use in a home network so as to be accessible through a gateway connected to an external communication network and has a flash memory for storing the protocol. The protocol stored in the flash memory is automatically upgraded with a new version thereof simply and conveniently with-

out waste of time and manpower, when it is updated with the new-version protocol in a service provision server which provides home appliance information. The version upgrade of an existing home appliance can be performed without a serviceman's home visit or a user's separate manipulation, thereby enabling data compatibility between the- existing home appliance and a home appliance being newly released to the market.

FIG. 1



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a method for upgrading a protocol of a networkable home appliance, and more particularly to a method for upgrading a protocol of a home appliance which is manufactured for use in a home network so as to be communicatable through a gateway connected to an external communication network and has a flash memory for storing the protocol, wherein the protocol stored in the flash memory is upgraded with a new version thereof.

Description of the Related Art

[0002] With the development of Internet networks, recently, most home appliances have been made to be of a multitask type having additional functions as well as their original functions. For example, some home appliance products may be equipped with local area network (LAN) cards or modems such that they are communicatably connected to communication networks. Such home appliance products may be upgraded in version through transmission and reception of data over communication networks or controlled in operation at any communicatable places outside of their installed places.

[0003] Generally, a communication device is provided in a home to transfer signals between home appliances and transmit and receive those signals via a communication cable. In this regard, for the purpose of gaining access to a specific home to control home appliances therein, an external remote system must be connected to a communication device in the specific home through a communication connection service provided by an Internet service provider (ISP), to transmit and receive various data to/from the home appliances. In some cases, programs or protocols used in the home appliances may be upgraded in the data transmission and reception procedures.

[0004] However, because home appliances are different in replacement time according to users' tastes, fashions, products' lifetimes and so forth, protocols for transmission and reception of signals such as program data may not be the same between products being newly introduced to the market and old ones. For this reason, the transmission and reception of data may be impossible between products, even those of the same manufacturer, thereby making it hard to smoothly operate a home network.

[0005] In order to solve the above problem, old products must be replaced with ones being newly introduced to the market, or a read only memory (ROM) or flash ROM of each home appliance having a protocol of the home appliance stored therein must be replaced directly with a new one. In this case, a user of each home ap-

pliance deals with the trouble of checking a protocol whenever a new product comes into the market. In particular, the replacement of an old product with a new one increases an economic burden on the user.

SUMMARY OF THE INVENTION

[0006] Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a method for upgrading a protocol of a home appliance which is manufactured for use in a home network so as to be communicatable through a gateway connected to an external communication network and has a flash memory for storing the protocol, wherein the protocol stored in the flash memory is automatically upgraded with a new version thereof simply and conveniently without waste of time and manpower.

[0007] In accordance with the present invention, the above and other objects can be accomplished by the provision of a method for upgrading an existing protocol of at least one networkable home appliance, comprising the steps of a) updating the existing protocol of the home appliance with a new-version protocol and storing the updated new-version protocol in a service provision server; b) sending the new-version protocol stored in the service provision server to a gateway connected to the home appliance, so as to download the new-version protocol from the server to the gateway; and c) upgrading the existing protocol of the home appliance with the new-version protocol downloaded to the gateway.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a block diagram showing the construction of a networkable home appliance system to which the present invention is applied;

Figs. 2a and 2b are flow charts illustrating a method for upgrading a protocol of a networkable home appliance in accordance with the present invention;

Fig. 3 is a view showing a data arrangement of a flash memory installed in the home appliance; and

Fig. 4 is a flow chart illustrating a procedure of processing communication data in the home appliance.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] Fig. 1 is a block diagram showing the construction of a networkable home appliance system to which the present invention is applied, Figs. 2a and 2b are flow

charts illustrating a method for upgrading a protocol of a networkable home appliance in accordance with the present invention, and Fig. 3 is a view showing a data arrangement of a flash memory installed in the home appliance.

[0010] In a preferred embodiment of the present invention, a protocol or operating program of a home appliance is stored and upgraded in a flash memory. Alternatively, the protocol or operating program may be stored and upgraded in any other memory as long as this memory is appropriate to the object and operation of the invention.

[0011] First, a description will hereinafter be given of the home appliance protocol upgrading method according to the present invention with reference to Fig. 2. First, if an existing protocol 11 stored in a service provision server 1 is updated with a new-version protocol 16, then the server 1 notifies a gateway 2 connected to networkable home appliances 3a, 3b and 3c installed in each home of such a situation at the first step S1. In the present embodiment, the service provision server 1 stores product information, product Internet protocol (IP) variation information, upgraded data relating to each product, a protocol, etc. to remotely control the networkable home appliances 3a, 3b and 3c.

[0012] Upon receiving the protocol update notification from the service provision server 1 at the above first step S1, the gateway 2 determines at the second step S2 whether a user desires to download the new-version protocol 16 from the server 1. If it is determined at the second step S2 that the user does not desire to download the new-version protocol 16, the existing protocol 11 is used continuously without downloading the new-version protocol 16.

[0013] On the other hand, in the case where it is determined at the above second step S2 that the user desires to download the new-version protocol 16, the gateway 2 downloads the protocol 16 from the service provision server 1 at the third step S3.

[0014] After downloading the new-version protocol 16 at the above third step S3, the gateway 2 instructs each of the networkable home appliances 3a, 3b and 3c in the home to determine whether it can upgrade the existing protocol 11 with the new-version protocol 16, at the fourth step S4.

[0015] In the present embodiment, whether the protocol upgrade is possible can be determined on the basis of the comparison between the size of a spare area of a flash memory 10 contained in each of the home appliances 3a, 3b and 3c and the size of the new-version protocol 16. If the spare area of the flash memory 10 is greater in size than the new-version protocol 16, the protocol upgrade is determined to be possible.

[0016] The flash memory 10 stores both of the existing protocol 11 for networking of the home appliances 3a, 3b and 3c and the new-version protocol 16, between which is defined a shared area 12.

[0017] In the case where the protocol upgrade is de-

termined to be possible at the above fourth step S4, each of the home appliances 3a, 3b and 3c notifies the gateway 2 of an upgrade start address of the flash memory 10 at the fifth step S5, and the gateway 2 sends a packet containing a version name 13 of the new-version protocol to each home appliance at the sixth step S6 to instruct it to write the version name 13 into the upgrade start address notified at the fifth step S5.

[0018] After writing the protocol version name 13 at the above sixth step S6, the gateway 2 writes random data 14 into the flash memory 10 at the seventh step S7 and then confirmation data 15 having the same size as that of the random data 14 into the flash memory 10 at the eighth step S8.

[0019] Note that the above sixth to eighth steps S6 to S8 are steps initially performed for the upgrade of the existing protocol 11 in the flash memory 10 of each of the home appliances 3a, 3b and 3c with the new-version protocol 16 by the gateway 2. That is, before downloading the new-version protocol 16 from the gateway 2, each home appliance downloads the protocol version name 13, the random data 14 for determination about whether the protocol 16 has been correctly downloaded, and the confirmation data 15 having the same size as that of the random data 14. These steps enable the protocol upgrade to be smoothly performed.

[0020] At the ninth step S9, the protocol upgrade is performed by downloading the new-version protocol 16 from the gateway 2 and then writing it into the flash memory 10 beginning with an address subsequent to an address where the confirmation data 15 is written at the above eighth step S8. At the tenth step S10, a determination is made as to whether the protocol upgrade has been completed.

[0021] If the protocol upgrade is determined not to have been completed at the above tenth step S10, the method returns to the above ninth step S9 to continuously download the new-version protocol 16. Alternatively, in the case where the protocol upgrade is determined to have been completed at the above tenth step S10, the method proceeds to the eleventh step S11 to update the confirmation data 15 written at the above eighth step S8 by writing data indicative of the completion of the protocol download into the address of the confirmation data 15.

[0022] At the twelfth step S12, whether the new-version protocol 16 has been normally downloaded and the protocol upgrade has been thus normally performed at the above ninth step is determined by comparing the confirmation data 15 updated at the eleventh step S11 with the random data written at the seventh step S7. At the thirteenth step S13, a determination is made as to whether the comparison at the twelfth step S12 exhibits a regular data format combination.

[0023] In the present embodiment, in the normal state, the random data 14 and the confirmation data 15 are the same or are regularly combined to have their formats shifted with respect to each other. In this regard,

whether the upgrade of the existing protocol 11 with the new-version protocol 16 has been normally performed can be determined from the comparison between the random data 14 and the confirmation data 15.

[0024] Where the comparison is determined to exhibit the regular data format combination at the above thirteenth step S13, the protocol upgrade is regarded as having been correctly completed at the fourteenth step S14, and data is processed among the home appliances 3a, 3b and 3c according to the upgraded new-version protocol 16 at the fifteenth step S15.

[0025] However, in the case where the comparison does not exhibit the regular data format combination at the above thirteenth step S13, the protocol upgrade is regarded as being stopped halfway or subject to error occurrence, not having been correctly completed, at the sixteenth step S16, and data is processed among the home appliances 3a, 3b and 3c according to the existing protocol 11 at the seventeenth step S17.

[0026] Fig. 4 is a flow chart illustrating a procedure of processing communication data in each home appliance after the protocol upgrade is performed. First, upon receiving a command packet sent from the gateway 2 at the first step S21, each of the home appliances 3a, 3b and 3c analyzes a header of the received packet to determine whether a version name of the received packet is the same as an existing version name at the second step S22.

[0027] In the case where it is determined at the above second step S22 that the version name of the received packet is the same as the existing version name, each home appliance analyzes and processes the received packet through the existing protocol 11 at the third step S23.

[0028] On the contrary, if the version name of the received packet is not the same as the existing version name at the above second step S22, each home appliance compares it with the version name 13 of the upgraded protocol stored in the flash memory 10 thereof to determine whether they are the same at the fourth step S24.

[0029] Upon determining at the above fourth step S24 that the two version names are not the same, each home appliance recognizes that it cannot process the received packet, and then sends a packet process disable message to the gateway at the fifth step S25.

[0030] On the other hand, in the case where the two version names are determined to be the same at the fourth step S24, each home appliance recognizes that the received packet must be processed according to the upgraded protocol 16. As a result, each home appliance moves to a start address of the new-version protocol 16 at the sixth step S26, and then determines at the seventh step S27 whether the random data 14 and the confirmation data 15 are the same, so as to determine whether the protocol upgrade has been correctly performed.

[0031] Where the random data 14 and the confirma-

tion data 15 are determined to be the same at the above seventh step S27, each home appliance recognizes that the new-version protocol 16 has been stored therein with no error and the existing protocol 11 has been upgraded with the protocol 16. Thus, each home appliance analyzes and processes the packet received at the first step S21 through the upgraded protocol 16 at the eighth step S28.

[0032] However, where the random data 14 and the confirmation data 15 are determined not to be the same at the above seventh step S27, each home appliance sends an incorrect protocol upgrade message to the gateway 2 at the ninth step S29.

[0033] As apparent from the above description, the present invention provides a method for upgrading a protocol of a home appliance which is manufactured for use in a home network so as to be communicatable through a gateway connected to an external communication network and has a flash memory for storing the protocol, wherein the protocol stored in the flash memory is automatically upgraded with a new version thereof simply and conveniently without waste of time and manpower. According to this invention, the version upgrade of an existing home appliance can be performed without a serviceman's home visit or a user's separate manipulation. Therefore, the invention has the effect of establishing data compatibility between the existing home appliance and a home appliance being newly released to the market.

[0034] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. A method for upgrading an existing protocol of at least one networkable home appliance, comprising the steps of:

- a) updating the existing protocol of said home appliance with a new-version protocol and storing the updated new-version protocol in a service provision server;
- b) sending said new-version protocol stored in said service provision server to a gateway connected to said home appliance, so as to download said new-version protocol from said server to said gateway; and
- c) upgrading said existing protocol of said home appliance with said new-version protocol downloaded to said gateway.

2. The method as set forth in claim 1, wherein said step b) includes the steps of:

b-1) determining whether a user of said home appliance desires to download said new-version protocol from said service provision server to said gateway; and

b-2) downloading said new-version protocol from said service provision server to said gateway if it is determined at said step b-1) that the user desires to download said new-version protocol.

3. The method as set forth in claim 1, wherein said step c) includes the steps of:

c-1) determining whether said existing protocol of said home appliance can be upgraded with said new-version protocol; and

c-2) upgrading said existing protocol of said home appliance with said new-version protocol if it is determined at said step c-1) that said existing protocol of said home appliance can be upgraded with said new-version protocol.

4. The method as set forth in claim 3, wherein said step c-1) includes the step of comparing a size of a spare area of a protocol storage memory of said home appliance with a data size of said new-version protocol and, if the size of the spare area of said memory is greater than the data size of said new-version protocol, determining that said existing protocol of said home appliance can be upgraded with said new-version protocol.

5. The method as set forth in claim 1, wherein said step c) includes the steps of:

c-1) allowing said home appliance to notify said gateway of an upgrade start address of a protocol storage memory thereof; and
c-2) writing said new-version protocol into said protocol storage memory beginning with said upgrade start address.

6. The method as set forth in claim 5, wherein said upgrade start address of said protocol storage memory is spaced apart from a written address of said existing protocol by certain addresses such that said existing protocol and said new-version protocol are together stored in said memory.

7. The method as set forth in claim 5, wherein said step c-2) includes the steps of:

c-2-1) sequentially writing a version name of said new-version protocol, random data and confirmation data into said protocol storage memory beginning with said upgrade start address, said random data being data randomly extracted from said new-version protocol, said

confirmation data having the same size as that of said random data; and

c-2-2) writing said new-version protocol into said protocol storage memory beginning with an address subsequent to a written address of said confirmation data.

8. The method as set forth in claim 7, further comprising the step of:

d) comparing said random data with said confirmation data after storing said new-version protocol, to determine whether said new-version protocol has been normally written.

FIG. 1

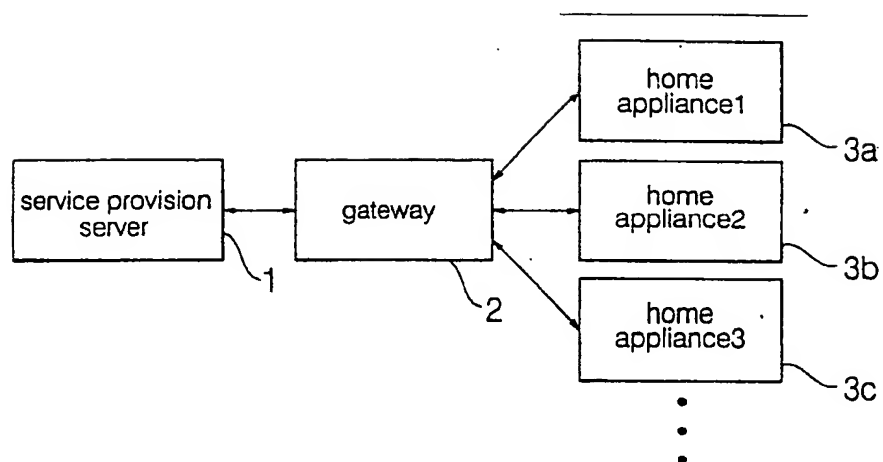


FIG. 2a

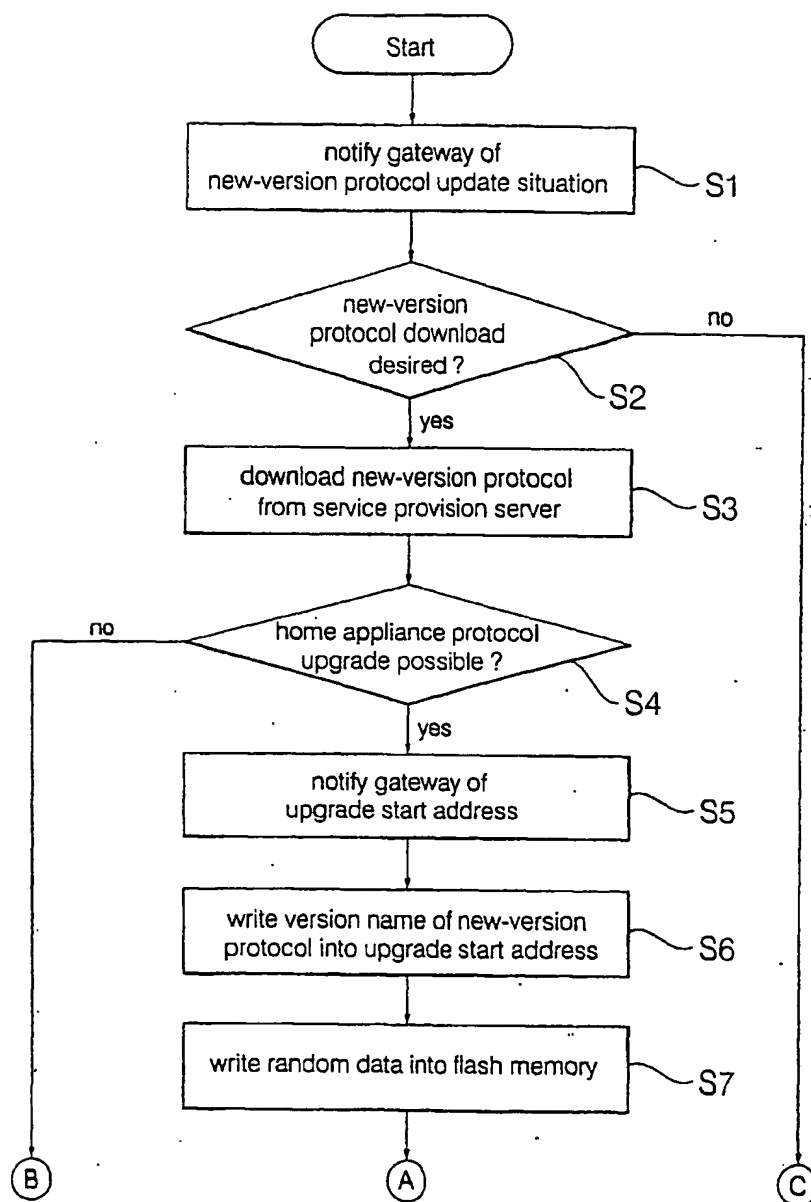


FIG. 2b

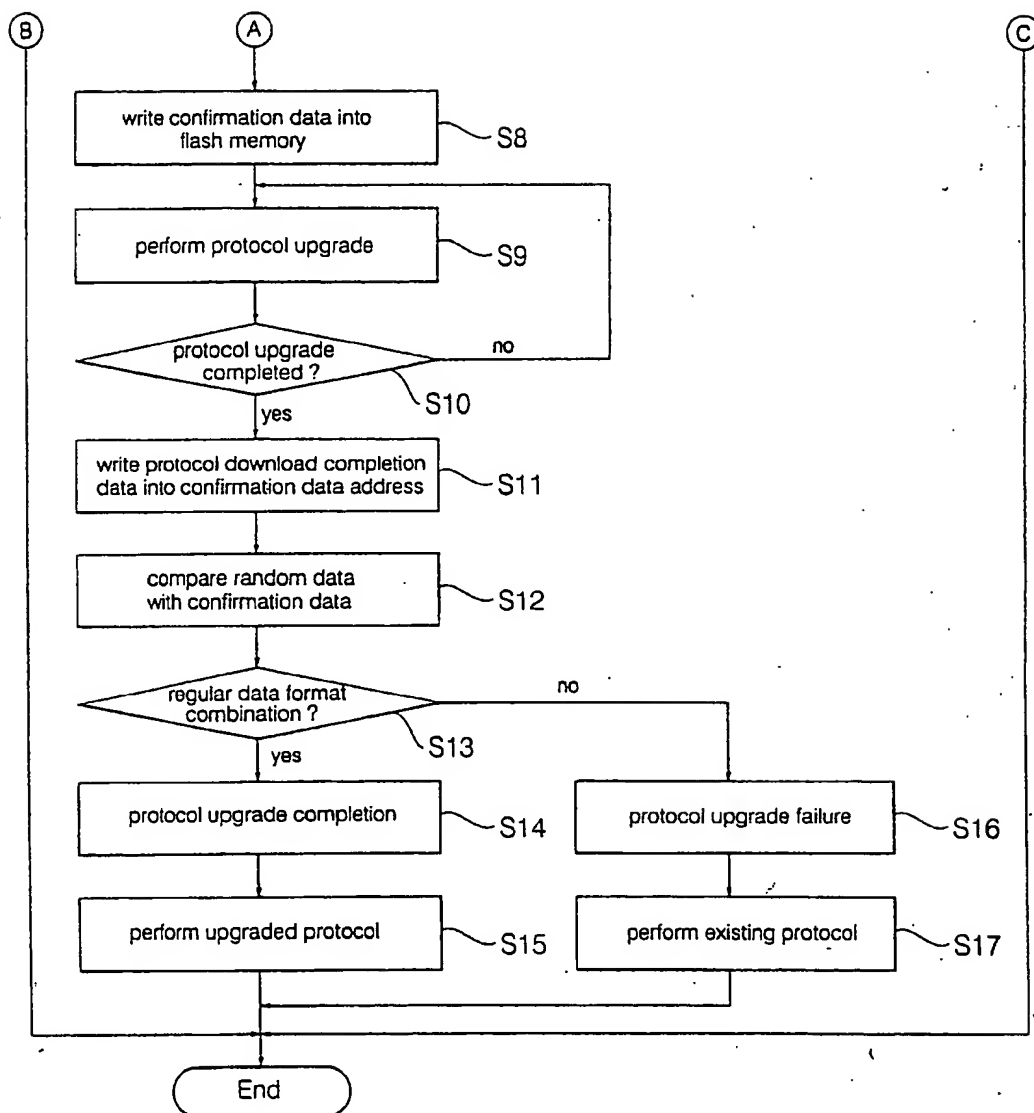


FIG. 3

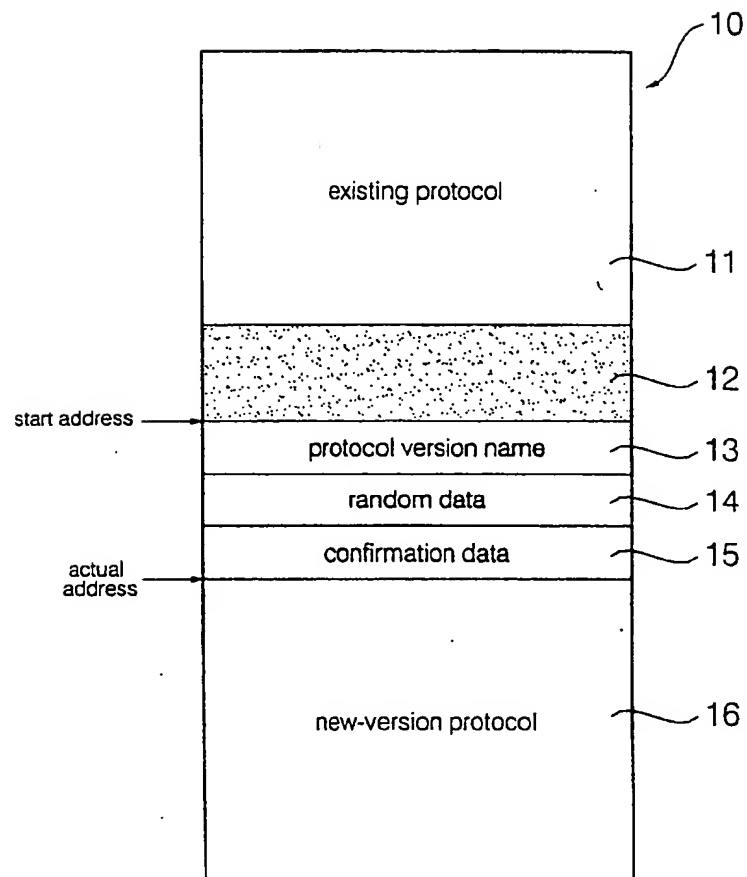
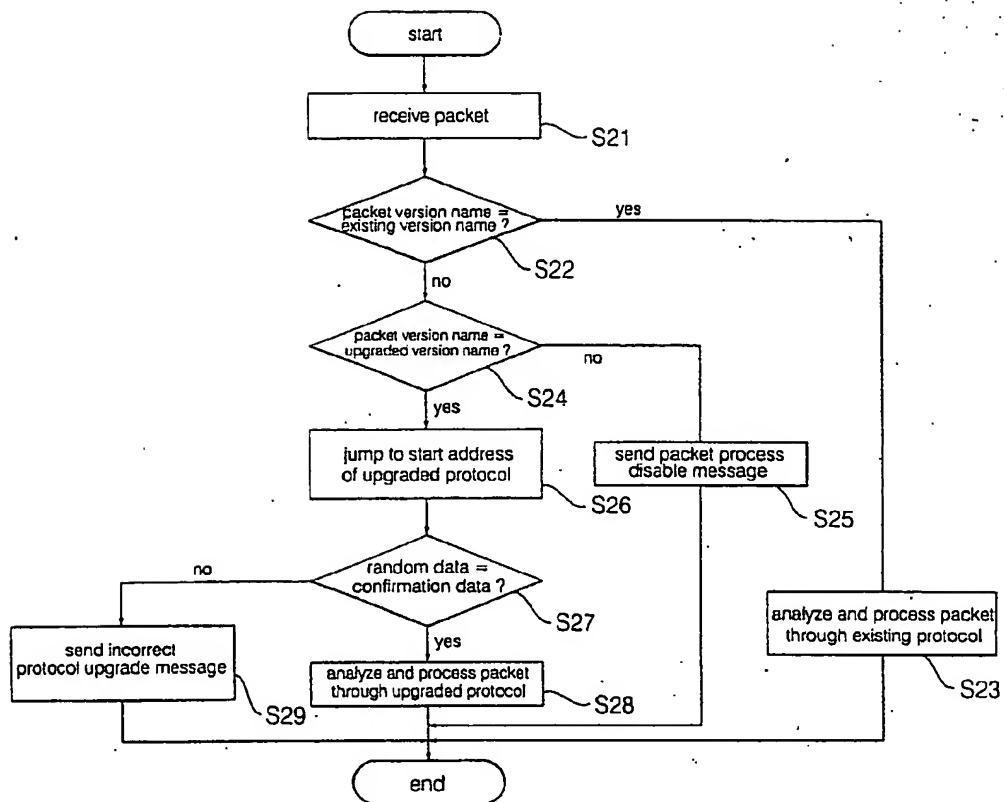


FIG. 4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 5776

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Place of search MUNICH		Date of completion of the search 24 September 2002	Examiner Losseau, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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